

Thermal Control

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Thermal Control Assumptions (1)

- Variable Solar Distance
 - ~0.85 to ~1.2 AU
- Spacecraft attitude wrt the Sun
 - constrained to solar pointing
 - cone angle limits / design range ?
- Electrical loads
 - constant
 - safe or cruise mode type operations ?
- Thermal design the same for both S/C

Thermal Control Assumptions (2)

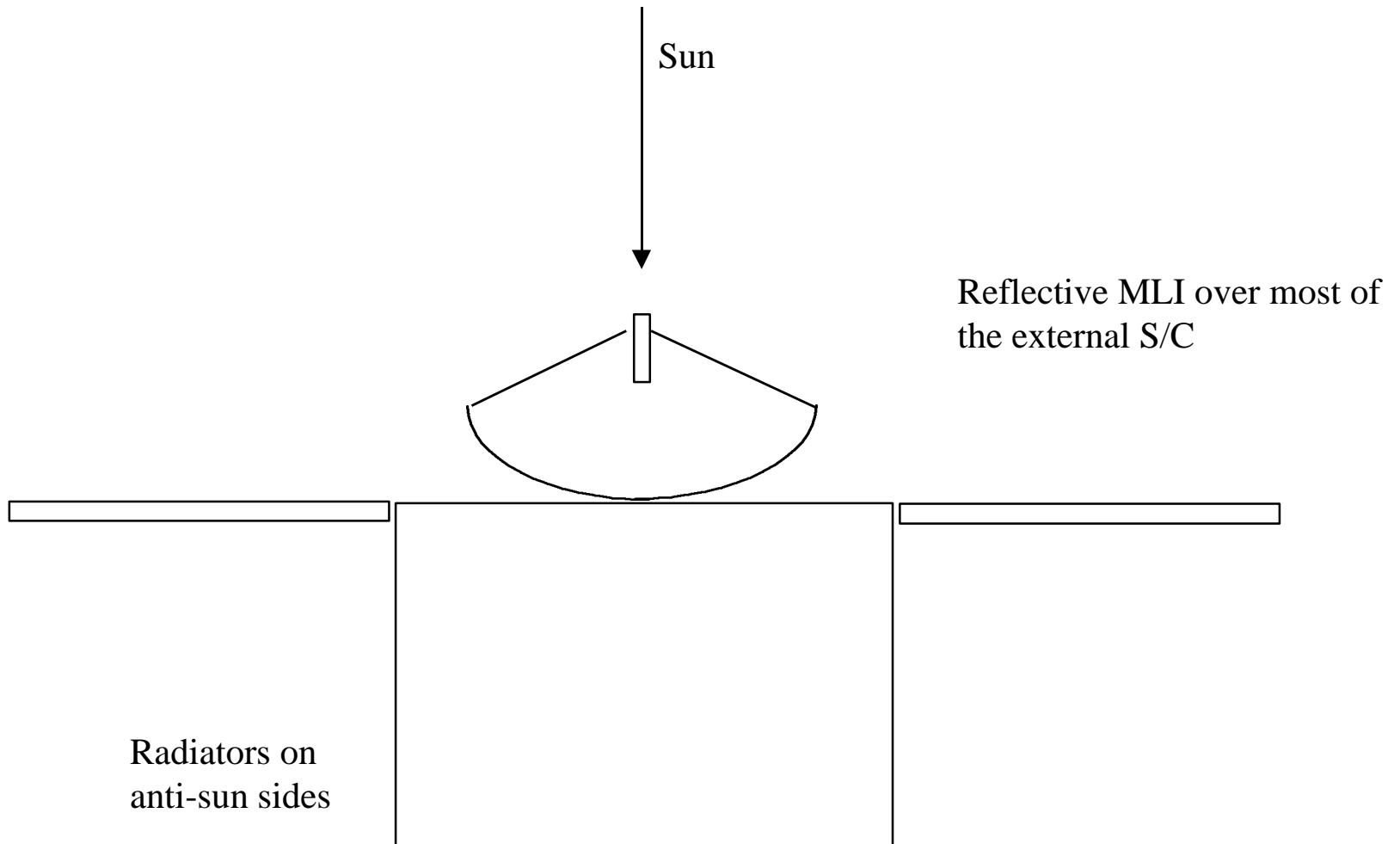
- NEAR like S/C thermal approach
 - yields a simple and robust spacecraft design
 - minimal impact on S/C
 - low heater power
 - no louvers or heat pipes
 - smart package layout
 - cleanliness requirement : 300,000
 - ESD requirement : none
 - all heaters always enabled
 - minimizes OP's intervention

Thermal Control Assumptions (3)

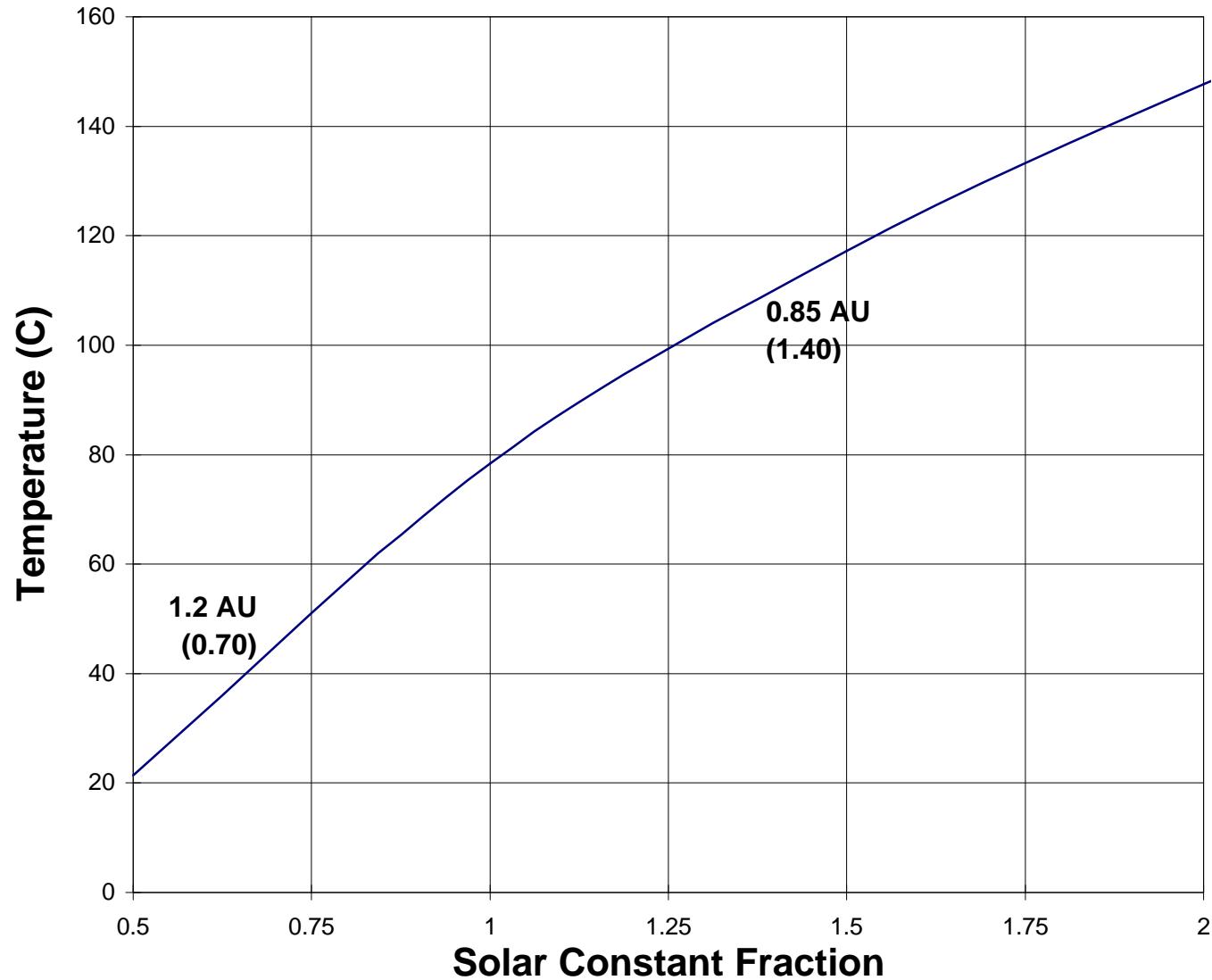
- NEAR like instrument thermal approach
 - thermally isolated from S/C
 - thermal design done by instrument
 - keeps instrument development in parallel with S/C
 - wide interface temperature range
 - independent sub-system level testing
 - survival heater circuits always enabled

Launch Vehicle Thermal Environments

- Athena Launch option should be benign
 - S/C is launched and deployed quickly
- Space Shuttle Launch option requires more rigorous analysis
 - bay environments could be severe
 - hot conditions
 - very limited power
 - reduced thermal model must be supplied
 - results iterated by SST / STEREO working group



Typical Solar Panel Temperature vs Solar Constant Fraction



Thermal Vacuum Testing (1)

- Components tested per STEREO Component Environmental Test Plan
 - Draft to be completed by Requirements Review
- Integrated Spacecraft level TV test
 - balance (one / maybe both)
 - thermal cycle (both spacecraft)
 - minimum 3 cycles
 - cumulative 90 hours @ each extreme

Thermal Vacuum Testing (2)

- Dual spacecraft thermal vacuum configuration (GSFC chamber 290)
 - assumes both S/C developed in parallel at least up to TV test
 - reflects costing
 - minimizes manpower

Thermal Vacuum Test Configuration

